2002

Planning and Managing School Facilities

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Factors Affecting Facility Needs

For much of the 20th century, school patrons assumed that school buildings needed to be replaced only because they were too old or improved only because they were too small to accommodate increased enrollment. While still relevant, these are not the sole reasons why nearly 50 percent of the nation's schools need to be replaced or refurbished. School reform, increased knowledge about the effects of environment on learning, and broadened educational expectations also have expanded the boundaries of adequacy. In addition, both the pace of societal change and the demands for educational improvement are accelerating—conditions that make it more necessary to reconfigure buildings during their normal life span.

As noted in the previous chapter, adequacy should be considered in relation to the present and the future; that is, a facility should be functional and remain functional during its life span. The purpose of this chapter is to identify and discuss four factors integral to evolving facility needs. They include demographic changes, school restructuring, technology, and the condition of existing buildings. These variables influence both the quantity and quality of spaces needed for contemporary elementary and secondary schools.

DEMOGRAPHIC CHANGES

Demography is the statistical study of human populations with special reference to size, density, distribution, and other related figures. National, state, county (or regional), and district population data provide critical information for educational planners. Because of state mandatory attendance laws, changes in

school population are driven by changes in the number of school-age children in the general population. Consequently, demographic analysis provides an essential quantitative input for determining facility needs.

From a national perspective, three facets of demographic conditions are especially cogent for elementary and secondary education. First, the overall enrollment in public elementary and secondary schools is again increasing. In the aftermath of the baby boom that affected schools for several decades following World War II, total enrollment in elementary and secondary education declined in the 1970s and early 1980s (U.S. Department of Education, 2000). Some demographers (e.g., Caffarella, 1987) believe that a lesser baby boom started in 1973 and ended in approximately 1988. From 1973 to 1998, this "baby-boom echo" resulted in an overall enrollment increase in public schools of about 17 percent. In elementary schools the increase was about 18 percent, and in secondary schools it was about 14 percent (*Digest of Education Statistics*, 1999). Second, the profile of the school population is continuing to change. The following data showing percentages of public elementary and secondary school enrollment by race and ethnicity in 1986 and 1997, reported in the *Digest of Education Statistics* (1999), verify this fact:

	1986	1997
White	70.4%	63.5%
Black	16.1%	17.0%
Hispanic	9.9%	14.4%

Third, the number of public schools operating in the United States is changing. Following World War II, school consolidation swept across many states. In 1930, there were 262,000 public schools. This figure steadily decreased through the 1970s, and, today, there are approximately 90,000 schools. While the current number of public schools is substantially lower than what it once was, there actually was an increase of about 5,000 schools between 1990 and 1997 (*Digest of Education Statistics*, 1999).

At the state level, patterns of student enrollment in public schools vary considerably. From 1970 to 1997, for example, public school enrollment in Florida increased by about 61 percent. In Texas, the increase was 34 percent, and in California it was 27 percent. During that same period, however, some states actually declined in pupil population. Nebraska, for instance, declined about 15 percent, and North Dakota declined about 30 percent (*Digest of Education Statistics*, 1999). Figures for these selected states illustrate how population patterns—and thus the need for school construction—vary markedly across the country. While some school districts in Florida (where all districts are large all-county systems) have had to build one or more new schools every year for the past 15 years to accommodate enrollment growth, some districts in other states have been forced to close schools as a result of enrollment declines.

According to the U.S. Department of Education (2000), growth in elementary and secondary school enrollment is not expected to be uniform across regions of the country. Public schools in the Midwest and Northeast are likely to experience decreases in their share of the national enrollment in the next decade, while schools in the South and West are likely to experience increases. Much of the increase in student enrollment in the South and West has been due to Hispanic children. The percentage of Hispanic students in western states, for example, rose from 15 percent to 30 percent between 1972 and 1998. Even more revealing is the fact that in 1998, 48 percent of students in public elementary and secondary schools in western states were minority students (U.S. Department of Education, 2000).

At one time, many states had rather homogeneous population patterns. Today, conditions within all states vary to some degree because of factors such as land values, migration patterns, economic development, and employment opportunities. As a consequence, variables such as poverty, race, and educational attainment are not distributed evenly—even within states (Hodgkinson, 1999). Thus, school officials also must pay close attention to regional and county demographic trends to determine general and student population shifts.

Demographics at the local district present another challenge. Unless districts have extremely stable population patterns, administrators need to monitor changes among schools. Unstable student populations have been most prevelant in larger districts. Many urban districts, for instance, lost thousands of students because of general population declines and because of court-ordered busing during the 1960s and 1970s. But these downward trends have not always been permanent. The Indianapolis Public Schools lost approximately 10,000 students after a judge ordered a one-way busing program. School district officials had to close schools and decide whether to retain or sell the property. Approximately 25 years later, the busing plan is being phased out and the district now faces the prospect of substantial enrollment increases.

In summary, the overall enrollment in elementary and secondary public schools is once again increasing. Clearly, this will require new or larger school buildings. But the growth pattern is not uniform: not all districts are growing. In addition, the nature of the population is changing; at the same time the overall student population is increasing, the percentage of white students enrolled in public education is declining.

SCHOOL RESTRUCTURING

Another variable affecting definitions of school building adequacy is restructuring. During the 1980s, school reformers attempted to improve educational outputs by tinkering with existing organizational structure. The intent was to "fix" the institution by essentially making students and teachers do more of what they were already doing (referred to as intensification mandates). Prime examples included increasing the length of the school day, graduation requirements,

and the length of the school year (Cuban, 1988; Raywid, 1990). Because they did not change the basic organizational structure of schools, these initiatives required little or no adaptations to school buildings.

More recently, however, reformers have embraced a different school reform perspective. They now conclude that schools will not be more effective unless roles, relationships, programs, and delivery of programs are reconfigured. More important, these transformations need to be site-specific—that is, the nature of the change will be shaped by the specific needs of local districts and schools and not by generic national standards. Thus, school restructuring is viewed as a school-specific process for school improvement. Whereas the reform initiatives of the 1980s had little effect on facilities, the concept of restructuring raises a number of consequential issues about school design (Goldberg, 1991).

From a process perspective, restructuring requires ample space to accommodate activities such as shared decision making, teacher collaboration, and team planning. Unfortunately, many existing schools are less than adequate in this regard. For example, they do not have sufficient spaces for small group activities, especially for small groups of adults. From a program perspective, restructuring often requires ample and appropriate spaces to accommodate emerging instructional strategies and curriculum modifications. Examples include using instructional teams in middle schools, some departmentalized instruction in elementary schools, and interdisciplinary courses in high schools. In general, restructuring requires schools to have sufficient and flexible spaces. However, a study sponsored by the General Accounting Office (1996) found that over half the nation's schools lacked these qualities.

One of the more popular restructuring ideas has been site-based management—a decentralization concept that makes the individual school more responsible for planning and program development. Principals involved in implementing this concept will readily acknowledge that new demands were placed on their facilities. For example, decentralization of authority almost always increases the number of meetings held in the school and increases parental involvement with the school. These changes usually require an interactive environment in which individuals can communicate freely and collaborate. The following are selected examples of reform ideas that have direct implications for school environments.

- *State Deregulation and District Decentralization.* Predicated on the idea that educational decisions are most effective when they are made closest to students, public education has shifted toward ideas such as site-based management. These concepts require more planning and policy decisions at the district and school levels. Consequently, facilities must accommodate both an increase in these activities and the technologies to support them.

- *Teacher Professionalism.* Greater autonomy for teachers requires more office and planning areas in schools. It also necessitates that teachers have access to technology that integrates voice, video, and data.

- *Shared Decision Making.* In traditional schools, the administrative areas are often limited in size because relatively few individuals had decision-making and management responsibilities. As the processes become more democratic, areas such as conference rooms become more essential.

- *Increased Community Involvement.* Most schools, especially elementary schools, were not designed to accommodate ongoing community involvement. Such involvement could include volunteer work, participation on committees, increased conferencing, and learning activities. Some new schools now include community pride rooms—areas that are used by adults to access the internet, to hold meetings, and similar activities.

- *Scheduling Modifications.* During the 1990s, several new approaches to scheduling education resurfaced. The most popular have included block scheduling (designed to intensify instruction), single-track year-round calendars (designed to reduce the negative effects of summer learning losses), and expanded summer programming (e.g., remedial courses for students who failed state tests). Such modifications affect both quantitative (e.g., amount of spaces needed) and qualitative (e.g., air-conditioning) dimensions of an adequate school.

- *Full-Service Schools.* Some communities have adopted the idea of providing full-service schools (sometimes called community schools). The initiative is premised on the idea that some children will not be able to reach their academic potential unless medical, social, emotional, physical, and psychological problems are addressed. Hence, the school facility must accommodate a range of specialists who provide these services on a full-or part-time basis.

School reform has also included specific curricular and instructional modifications that have implications for facilities. Among them, are the following:

- *Interdisciplinary Teams.* This concept is central to the middle-school philosophy and many expect it will become common in high schools. Teaming creates a need for planning spaces and diversified instructional spaces.

- *Technology Education.* The traditional curriculum in industrial education is rapidly being transformed into technology education. Hands-on courses such as woods and metals are being replaced with new courses such as electronics. Both the size of the instructional spaces and the nature of the equipment used are affected.

- *Increased Emphasis on Science.* More students are planning to attend college and enrollment in science courses is increasing. More and better-equipped labs are necessary. Many new elementary schools now have one or more science laboratories, which allows younger students to engage in active learning. Outdoor science areas (nature labs) also are becoming common.

- *Individualized Instruction.* A greater focus on individual learning styles and ability differences create the need for a greater variety of learning spaces. In secondary schools this may include areas for individual learning, and in elementary schools this may include areas for small-group instruction.

TECHNOLOGY

Adhering to the guiding principle that form follows function, architects who design educational environments recognize that operations affect appearance (Sabo, 1996). Unfortunately, there usually is a considerable lag time between the introduction of new programs, ideas, and equipment and the redesign of spaces. As an example, some schools designed in the early 1980s did not have computer labs, and some designed in the early 1990s did not have sufficient wiring and cable to provide widespread access to the Internet. The problem is made even worse by the fact that advancements in technology are occurring at an increasingly rapid rate. Thus, anticipating future advancements in technology has become one of the greatest challenges facing architects and school administrators.

Personal computers and their interconnectivity have had a substantial impact on many, but not all, schools in the past 25 years. A national study in the mid-1990s found that most schools did not fully use modern technologies and lacked access to the information superhighway (General Accounting Office, 1996). This was particularly true in the oldest schools. Of schools built in 1985 or later, 59 percent were connected to the Internet in 1995, whereas only 42 percent of the schools built before 1969 had such connections (U.S. Department of Education, 1999).

The extent to which technology has contributed to new definitions of adequate schools is exemplified by its deployment in teaching and administration. The digital revolution and real-time communication encourage educators to use integrated voice, video, and data in their daily activities. In the modern school, one would find

- Keyboarding (computer) labs,
- Computers in every classroom, office, conference area, and support area,
- Networking,
- Distance learning classrooms,
- Head-end and file server rooms,
- Visual information systems that allow visual tapes, Power Point presentations, telephone conferencing, and similar functions to occur in every classroom,
- Modern media centers equipped with a range of technologies (e.g., fax machines, electronic catalogs).

Technology also has affected all support services commonly found in schools. Examples include food services, energy management, facility maintenance, and inventory control. Today, most new school buildings are designed to incorporate structured wiring systems that integrate building automation, energy management, and fire alarm and security functions.

The infusion of technology into school buildings almost always increases

space requirements. This is especially true with respect to the average classroom. For example, a second-grade classroom may have 900 square feet and accommodate 25 pupils. Once you put four or five computers in that space, the area becomes crowded—especially if the computers are dispersed around the room. Obviously, labs and operation rooms add to the overall size of schools. Almost always, technology increases the cost of constructing or renovating school buildings (Glass, 1999), a factor not always apparent to taxpayers. And the public does not always support increased costs due to technology. Some critics (e.g., Oppenheimer, 1997) have argued that there is little evidence to support the contention that computers have had a positive effect on learning. Such judgments, however, are myopic and ignore the reality that the computer has contributed to new ways of accessing and using information—and in this regard, they created new ways of learning.

CONDITION OF EXISTING BUILDINGS

Despite several national reports detailing a school facility crisis in America, many taxpayers still do not recognize the magnitude of the problem. In 1998, the average public school building in this country was 42 years old; the average age of a building in Northeast and Central states was 47, and in Southeast states it was 37 (U.S. Department of Education, 1999). In a 1995 study, the General Accounting Office (1996) discovered that almost 60 percent of the nation's schools reported at least one major building feature in disrepair, requiring extensive repair or replacement. Buildings in disrepair negatively affect the morale, health, and productivity of both teachers and students (Frazier, 1993). In the mid-1990s, it was estimated that public elementary and secondary education needed about $112 billion to address current deficiencies (General Accounting Office, 1996).

The projected life span of a school building is not uniform. While some are designed to last up to 70 years, others become obsolete in less than 40 years. Funding school construction, especially in those states requiring local taxpayers to assume all or most of the burden, is both an economic and a political issue (Kowalski & Schmielau, 2000). Often inexpensive facilities are constructed on the premise that the next generation of taxpayers will pay to improve or replace them. But when the next generation abdicates this responsibility, an even greater burden gets passed to a third generation of taxpayers. This philosophy and an overall neglect for proper maintenance have certainly contributed to the current facility crisis (Krysiak, 1999).

The utility of existing facilities also has been reduced by a greater awareness of health and safety standards. From a health perspective, environmental hazards such as radon gas and asbestos, lead paint, and poor indoor air quality are responsible for many older buildings being labeled as "sick schools" (Grubb & Daimantes, 1998). From a safety perspective, older schools were rarely designed to provide access control and pupil control. And because health and safety con-

cerns present an immediate danger, many districts have had to use operating funds to resolve these problems (Ornstein, 1994)—an action that further reduces the effectiveness of schools.

In general, schools require some renovation and equipment replacement after just 20 years. Even when funds to do this have been available, some school district officials postponed action because limited resources earmarked for facilities were used to cover other educational needs (Marcus, 1995). Both deferred maintenance and an unwillingness to replace buildings at reasonable intervals have contributed to the existing crisis. In some communities, voters have repeatedly rejected recommendations for school construction, even when the need for such action was blatantly obvious. Most often, they did so because they rejected the premise that property taxes should be the primary funding source for school construction.

While funding school construction is both an economic and political issue, the political dimensions have typically been more dominant (Dahlkemper, 1997). In states that require local districts to cover all or most of the costs of school construction with property tax revenues, district officials have encountered fierce opposition from property owners who did not have children enrolled in the public schools. Differences in property wealth in these states have resulted in tremendous disparities in tax rates and in the quality of educational facilities. Consequently, districts most needing to replace or renovate schools often experience the greatest difficulty getting taxpayer approval for such initiatives.

The effects of neglecting school buildings have been compounded by the proclivity of governors and state legislators to mandate school improvement initiatives without providing necessary funding. For example, some states are restricting enrollment in primary grades—a supportable idea that nevertheless produces the need for more elementary school classrooms. Yet, these same policy makers have rarely provided districts with money to construct the additional classrooms. Reductions in class size, extended school years, all-day kindergarten or preschool programs, and expanded graduation requirements are common examples of state policies resulting in a need for more space.

CHAPTER SUMMARY

The adequacy of the nation's infrastructure for public education is being affected by four primary variables presented in this chapter. Enrollment is again rising, creating the need for more classrooms; for example, the 51.7 million students enrolled in elementary and secondary schools in 1997 is higher than the previous record of 51.3 million set in 1971 (Jones, 1997). In addition, the student population is becoming increasingly diverse—a condition that also presents challenges for programming and for facilities to house the programs.

School restructuring and technology also present new needs for school buildings. The process of restructuring requires areas for visioning and planning, community involvement, and collaborative decision making. In addition, the

outcomes of the process are likely to require additional and different instructional spaces in many schools. The infusion of computers and other new technologies into schools over the past 25 years also add to space needs. More important, technology has already altered the ways in which many teachers and administrators work.

Finally, the infrastructure of America's schools is weakened by the fact that many existing buildings are old, unhealthy, and unsafe. A combination of antiquated state policies requiring total or near-total local funding, neglected maintenance, and increased environmental hazards are responsible.

ISSUES FOR DISCUSSION

1. In what ways do changes in migration and birth patterns affect the need for school facilities?
2. What factors might affect enrollment trends in a school district?
3. In what ways might increased diversity affect the design of school buildings?
4. What does school restructuring mean? Is restructuring a process or a product?
5. Both state deregulation and district decentralization have become popular reform ideas. What implications do these concepts have for school design?
6. What mandates in your state have contributed to an increased need for school facilities?
7. In what ways have computers contributed to the need for school construction?
8. What new technologies other than computers are commonly found in the modern school? How do these technologies affect definitions of adequacy?
9. What are some barriers in older schools that may physically prevent technology from being deployed?
10. How might technology affect the cost of school construction?
11. As many as 50 percent of the schools in this country need to be replaced or renovated. What has caused this crisis?
12. How does initial cost affect the life expectancy of a building?
13. Often, funding school construction is both an economic and political issue. Why?
14. In states where a majority of the cost of school construction comes from local tax revenues, how does district wealth (as measured by taxable property) deter or enhance a district's ability to improve school facilities?

REFERENCES

Caffarella, E.P. (1987). Effects of the baby boomette on school enrollment. *School Business Affairs, 53*(7), 26–28, 41–43.

Cuban, L. (1988). The fundamental puzzle of school reform. *Phi Delta Kappan, 69*(5), 341–344.

Dahlkemper, L. (1997). Rundown schools: Whose responsibility? *State Legislatures, 23*(8), 15–19.

Digest of education statistics. (1999). Washington, DC: National Center for Education Statistics, U.S. Department of Education.

Frazier, L.M. (1993). *Deteriorating school facilities and student learning.* (ERIC Document Reproduction Service No. ED 356 564)

General Accounting Office. (1996). *School facilities: America's schools report differing conditions.* Washington, DC: U.S. Government Printing Office.

Glass, T.E. (1999). Hidden costs of school construction. *School Business Affairs, 65*(7), 6–8, 10–12.

Goldberg, B. (1991). Redesigning schools: Architecture and school restructuring. *Radius, 3*(1).

Grubb, D., & Diamantes, T. (1998). Is your school sick? Five threats to healthy schools. *Clearing House, 71*(4), 202–207.

Hodgkinson, H. (1999). State differences: The key to demographics. *School Business Affairs, 65*(5), 32–36.

Jones, R. (1997). The kids are coming. *American School Board Journal, 184*(4), 20–24.

Kowalski, T.J., & Schmielau, R. (2000, April). *Potential for achieving liberty and equality in funding school construction: Analysis of state laws and policies at the end of the 20th century.* Paper presented at the annual conference of the American Educational Research Association, New Orleans, LA.

Krysiak, B.H. (1999). Keeping up with what you have. *School Business Affairs, 65*(7), 49–53.

Marcus, J. (1995). A sorry state of disrepair. *American School Board Journal, 182*(4), 37–39.

Oppenheimer, T. (1997). The computer delusion. *The Atlantic Monthly, 280*(1), 45–62.

Ornstein, A.C. (1994). School finance and the conditions of schools. *Theory into Practice, 33*(2), 118–125.

Raywid, M.A. (1990). The evolving effort to improve schools: Pseudo-reforms, incremental reform, and restructuring. *Phi Delta Kappan, 72*(2), 139–143.

Sabo, S.R. (1996). Shaping school design. *The American School Board Journal, 183*(10), 42–44.

U.S. Department of Education, National Center for Education Statistics. (1999). *How old are America's schools?* (NCES 1999–048). Washington, DC: U.S. Government Printing Office.

U.S. Department of Education, National Center for Education Statistics. (2000). *The condition of education 2000* (NCES 2000–602), Washington, DC: U.S. Government Printing Office.